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ABSTRACT

In its fourth year, Project MASTER served 477 Spanish-speaking students in 5 elementary schools in the Bronx. The teaching strategy was holistic, integrating all aspects of the curriculum with English-language learning through science projects. The project developed curriculum materials, stressing attitudes toward and knowledge of science topics, and actively pursued capacity-building among bilingual teachers at project sites and in community projects. Objectives were achieved in English as a Second Language and mathematics. Assessment of objectives in science was not possible. Project strengths included a holistic, interdisciplinary, hands-on approach, an active engagement with community ventures, and the maintenance of an excellent relationship with school personnel. One recommendation for program improvement is the dedication of resources to capacity building for bilingual teachers, which will provide the necessary resources for incorporation of the project's approach into the regular school curriculum. (MSE)

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# OREA Report

## EVALUATION SECTION REPORT

LANGUAGE DEVELOPMENT THROUGH
HOLISTIC LEARNING
(Mathematics, Art, Science, Technology,
and Education Resources)

PROJECT MASTER
Grant Number G008525048
1988-89

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EVALUATION SECTION
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April 1990

# EVALUATION SECTION REPORT

## LANGUAGE DEVELOPMENT THROUGH HOLISTIC LEARNING
(Mathematics, Art, Science, Technology, and Education Resources)

PROJECT MASTER
Grant Number G008525048
1988-89

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LANGUAGE DEVELOPMENT THROUGH HOLISTIC LEARNING
PROJECT MASTER
1988-89

SUMMARY


- Project MASTER was fully implemented. Students developed English language, mathematics, and computer technology skills, and practiced critical thinking skills by using a hands-on approach to science projects. The program included staff development, implementation of the New York State science syllabus, a capacity building plan for bilingual teachers, and cultural activities.

- The project achieved its English as a Second Language and mathematics objectives. It was impossible to assess the science objective as proposed because there was no appropriate instrument.


Project MASTER was an Elementary and Secondary Education Act (E.S.E.A.) Title VII-funded project. In its fourth year of operation, the project served 477 Spanish-speaking students of limited English proficiency in five elementary schools in the Bronx, as compared with 575 students the previous year due to the elimination of the sixth grade at some of the schools. Project MASTER's teaching strategy was holistic: it integrated all aspects of the curriculum--mathematics, arts, and computer skills--with English-language learning through the medium of science projects. The project developed curriculum materials, stressing attitudes toward and knowledge of science topics within the context of bilingual education. It engaged actively in capacity building among bilingual teachers at project sites and in community projects.

To evaluate this project, the Office of Research, Evaluation, and Assessment (OREA) used attendance data and test scores provided by the program, citywide test results from the Language Assessment Battery and the Metropolitan Achievement Test in mathematics, and information obtained through interviews and observations.

The project achieved its objectives in English as a Second Language (E.S.L.), as it had in the previous year. It also achieved the objective in mathematics. While students mastered 65 percent of the objectives assigned to them, it was impossible to assess the science objective because the program never designed the instrument to measure attainment of the objective. (This objective was not assessed in 1987-88 either, because of lack of data.)

The strength of the program included its holistic, interdisciplinary, and hands-on approach to the education of students with limited English proficiency; its active engagement with community ventures such as the Reconstruction Project; and the excellent relationship it maintained with school personnel. Limitations, caused by budgetary restrictions, included shortage of staff and resources.

The conclusions, based on the findings of this evaluation, lead to the following recommendation:

- Dedicate such resources as are possible to the capacity building plan for bilingual teachers to provide the expertise necessary for the incorporation of the project's holistic methodology into the regular school program.

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# I. INTRODUCTION

This report documents the Office of Research, Evaluation, and Assessment's (OREA's) evaluation of the E.S.E.A. Title VII program, Language Development Through Holistic Learning (Project MASTER--Mathematics, Arts, Science, Technology, and Education Resources). The project was in its fourth year, the first of a two-year renewal grant. Project MASTER's goal was to develop the English language competencies of Spanish-speaking students of limited English proficiency (LEP students) by teaching mathematics, the arts, computer technology, and critical thinking through the medium of science projects. In addition, the project engaged in staff development, curriculum development, capacity building for bilingual teachers, cultural expansion activities for students, community participation, and parental involvement activities.

## HISTORY OF THE PROGRAM

Previous evaluation reports of Project MASTER have presented an overview of earlier years of the program. The final evaluation report of 1986-87 gives a detailed history of the program's development.

## SETTING

The project was housed in five schools in the South Bronx: P.S. 1, P.S. 25, P.S. 29, C.S. 47, and C.S. 77. The surrounding neighborhoods were areas of great poverty, with several public housing projects and poorly maintained private housing.

PARTICIPATING STUDENTS

Project MASTER submitted data for 477 students in the third through sixth grades, ages eight through 14. Almost one-third were over-age for their grade. (See Table 1.)

STAFF

Title VII funds paid for the project director, who had formerly been a resource teacher, and two educational assistants. The Division of Multilingual and Multicultural Education (DOMME) paid the salary of a secretary. The project director supervised and coordinated project activities. The educational assistants spent one day a week in each of the schools, providing hands-on laboratory experiences for LEP students.

DELIVERY OF SERVICES

At P.S. 29, the project had a resource center with areas for cooking, art, earth science, physical sciences, life science, and mathematics, with a library of books and audio visuals. At other schools, instruction took place in the individual classrooms. Schools were overcrowded, restricting the project's delivery of services.

REPORT FORMAT

This report is organized as follows: Chapter II describes the evaluation methodology; Chapter III presents an analysis of the qualitative and quantitative findings of the evaluation; and Chapter IV offers conclusions and a recommendation based upon the results of the evaluation.

TABLE 1

Number of Program Students by Age and Grade[a]

| Age | Grade 3 | Grade 4 | Grade 5 | Grade 6 | Total |
|---|---|---|---|---|---|
| 8 | 48 | 1 | 0 | 0 | 49 |
| 9 | 64 | 45 | 0 | 0 | 109 |
| 10 | 24 | 56 | 33 | 0 | 113 |
| 11 | 8 | 36 | 62 | 13 | 119 |
| 12 | 6 | 10 | 30 | 12 | 58 |
| 13 | 0 | 6 | 5 | 7 | 18 |
| 14 | 0 | 1 | 1 | 4 | 6 |
| TOTAL | 150 | 155 | 131 | 36 | 472[b] |

Over-Age Students

| | | | | | |
|---|---|---|---|---|---|
| Number | 38 | 53 | 36 | 11 | 138 |
| Percent | 25.3 | 34.2 | 27.5 | 30.6 | 29.2 |

Note. Shaded boxes indicate expected age range for grade.

[a] As of June 1989

[b] Data were missing for five students.

- Almost one-third of program students were over-age for their grade.

## II. EVALUATION METHODOLOGY

### EVALUATION QUESTIONS

The evaluation assessed two major areas: program implementation and outcome. Evaluation questions included the following:

#### Process/Implementation

- Did the program select students for participation according to specific criteria?
- Did the project implement the instructional activities for developing English language proficiency as proposed?
- Did the project implement the instructional activities for developing proficiency in mathematics as proposed?
- Did the project implement the instructional activities for developing proficiency in science as proposed?
- How did the project expand its students' experiences and collaborate with community agencies?
- How were parents involved in the program?

#### Outcome

- What was the average Normal Curve Equivalent (N.C.E.) gain on the Language Assessment Battery (LAB)?
- Were there significant gains on students performance in mathematics on the Metropolitan Achievement Test (MAT)?
- Did the students master the proposed percentage of science objectives?

### EVALUATION PROCEDURES

#### Sample

An OREA field consultant interviewed the project director, the two educational assistants, and the principal of C.S. 47.

She observed one day of classroom instruction. OREA provided student data forms for all participating students. The project returned completed forms for 477 students.

Instruments

OREA developed an observation schedule to document the classroom environment. It also developed guidelines for interviewing the project director and school principals. Project staff used OREA-developed data retrieval forms to report student demographic, attendance, and achievement data. Participating schools used the LAB to assess the acquisition of English language skills, the MAT to evaluate the acquisition of mathematics skills, and teacher-made instruments to evaluate learning in science.

Data Collection

The OREA field consultant interviewed school and program staff and observed classes in May 1989. OREA distributed data forms to the project director during the spring and collected them at the end of the school year.

Data Analysis

OREA used the Language Assessment Battery to assess improvement in English proficiency and the Metropolitan Achievement Test to assess performance in mathematics. Students' raw scores were converted to Normal Curve Equivalent (N.C.E.) scores, which have multiple advantages over other scoring methods. They are standard, normalized, and form an equal

interval scale. ("Standard" indicates that the unit of measurement is a fraction of the standard deviation of the original distribution of raw scores; "normalized" refers to the fact that the scale is adjusted for the norm group so that its distribution has the shape of a normal distribution; and "equal interval scales" allow for legitimate aggregation or averaging of scores.) Project students' N.C.E.s indicated their standing in relation to the national average of 50.

To assess the significance of students' achievement in English, OREA computed a correlated *t*-test on LAB and MAT N.C.E. scores. The *t*-test determined whether the difference between the pre- and posttest scores was significantly greater than would be expected by chance variation alone.

To insure representative achievement data, OREA included only those students who had been in the program for at least five months and had attended classes for at least 100 school days. OREA extrapolated to estimate full-year LAB and MAT scores of late-arriving and early-exiting students.

Limitations

Since all LEP students are entitled to receive bilingual and E.S.L. services, OREA was unable to select an equivalent control group. However, the use of two sets of data, as outlined above, served in lieu of a control group.

The project staff was so limited in number that it was unable to provide data on all program participants. However, the number of students for whom there were data was large enough to make the analysis meaningful.

## III. EVALUATION FINDINGS

Project MASTER provided instruction in English as a Second Language (E.S.L.), mathematics, science, and computer skills. The program included staff development, a capacity building plan for site bilingual teachers, implementation of the New York State science syllabus, enrichment activities through the Reconstruction of the South Bronx Project, and parental involvement activities. The project provided resources and coordinated services for its students by networking with several educational agencies.

### STUDENT PLACEMENT AND PROGRAMMING

The project did not choose individual students for participation. Site schools assigned students to bilingual classes if they scored below the twenty-first percentile on the Language Assessment Battery (LAB)* or on the basis of teacher evaluation. Project MASTER served all bilingual classes in the participating schools, unless there was more than one class for the grade, in which case it served the class that the school's principal deemed most needed its services.

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*The Language Assessment Battery (LAB) was developed by the Board of Education of the City of New York to measure the English-language proficiency of non-native speakers of English in order to determine whether their level of English proficiency is sufficient to enable them to participate effectively in classes taught in English. Students scoring below the twenty-first percentile on the LAB are entitled to bilingual and E.S.L. services.

INSTRUCTIONAL ACTIVITIES

Instruction in mathematics, science, computer skills, and English-language acquisition occurred simultaneously. Each class met once a week, received about two hours of instruction, and then broke up into small groups to work on related science tasks involving in-depth research techniques using mathematics, the computer, etcetera. Students chose their groups at the beginning of the school year, on the basis of interest and ability. Topics included animal life cycles, electricity, physics, the solar system, nutrition, plant life, and environmental education. Students drew charts; kept measures of rainfall or temperature; wrote logs of the techniques they used and observations they made; and used microscopes, telescopes, incubators, and stethoscopes. At the end of each semester, the students prepared reports on their work.

Students from a class visited by the OREA field consultant told her of having learned about weather, plants, various animal species, and the human body, and said that they particularly enjoyed the hands-on approach.

Project MASTER proposed instructional objectives in E.S.L., mathematics, and science.

English as a Second Language

- Participating students will demonstrate a significantly higher rate of growth in reading skills in English than similar non-participating students, as measured by a comparative analysis of pretest and posttest scores on the LAB.

Complete pre- and posttest data on the LAB were available for 170 students. Their average increase was 7.2 N.C.E.s (s.d.= 13.7), which was significant ($p < .05$). (See Table 2.) Project MASTER met its E.S.L. objective.

Mathematics

- Participating students will demonstrate a significant increase in mathematics concepts and skills as measured by a comparative analysis of pretest and posttest scores on the Metropolitan Achievement Test (MAT).

OREA retrieved pre- and posttest data on the MAT for 259 students. An analysis of the results indicated that the mean gain for the group was 5 N.C.E.s (s.d.= 14.8), which was significant ($p < .05$). (See Table 3.) Project MASTER achieved its mathematics objective.

Science

- Participating students will have mastered 70 percent of science concepts and skills on a program-developed criterion-referenced test.

OREA was unable to assess this objective as proposed because the program did not develop the criterion-referenced test. However, school and project staff measured student's mastery of several science objectives assigned to them. The project submitted this data for 397 students, 319 of whom had been in the program for at least five months and had attended a minimum of 100 days. Overall, project students mastered 65 percent of their objectives.

TABLE 2

Pretest/Posttest N.C.E. Differences on Language Assessment Battery, by Grade

| Grade | Number of Students | Pretest Mean | Pretest S.D. | Posttest Mean | Posttest S.D. | Difference Mean | Difference S.D. | t value |
|---|---|---|---|---|---|---|---|---|
| 3 | 68 | 15.3 | 29.4 | 29.4 | 11.9 | 14.1 | 14.1 | 8.29* |
| 4 | 60 | 21.8 | 8.2 | 22.4 | 13.2 | .6 | 11.4 | .41 |
| 5 | 38 | 16.6 | 10.3 | 21.4 | 13.9 | 4.8 | 10.3 | 2.89* |
| 6 | 3 | 21.0 | 9.6 | 36.7 | 8.5 | 15.7 | 17.8 | 1.53 |
| TOTAL | 170[a] | 17.9 | 10.5 | 25.1 | 13.2 | 7.2 | 13.7 | 6.88* |

* $p<.05$

[a]Information on grade was missing for one student.

- Students in grades three and five and overall made significant gains on the LAB.

TABLE 3

Pretest/Posttest N.C.E. Differences
on the Metropolitan Achievement Test, by Grade

| Grade | Number of Students | Pretest Mean | Pretest S.D. | Posttest Mean | Posttest S.D. | Difference Mean | Difference S.D. | t value |
|---|---|---|---|---|---|---|---|---|
| 3 | 49 | 40.2 | 21.4 | 43.2 | 22.0 | 3.0 | 19.0 | 1.10 |
| 4 | 99 | 34.8 | 18.4 | 44.3 | 14.3 | 9.5 | 13.7 | 6.88* |
| 5 | 83 | 45.2 | 14.2 | 48.3 | 16.7 | 3.1 | 13.4 | 2.08* |
| 6 | 28 | 57.0 | 19.3 | 55.4 | 22.5 | -1.6 | 9.8 | -.87 |
| TOTAL | 259 | 41.6 | 19.1 | 46.6 | 18.0 | 5.0 | 14.8 | 5.41* |

* $p<.05$

- Project students in grades four and five and overall made significant gains in mathematics on the MAT.

## NON-INSTRUCTIONAL ACTIVITIES

Project MASTER did not propose specific objectives for non-instructional activities. However, the project generated an important amount and variety of activities for the achievement of its educational goals and the expansion of students' cultural perspectives.

### Cultural Expansion

As a direct result of the project's initiative and collaboration with the Bronx Council of the Arts, participating schools collaborated with a number of cultural institutions offering resources and services. Among these institutions were the Bronx Botanical Gardens, the Bronx Borough President's Office, the American Museum of Natural History, the Longwood Avenue Gallery, the Lincoln Center for the Performing Arts, and the Metropolitan Museum of Arts.

### Staff Development

Educational institutions such as Teachers College and Hunter College provided staff development activities for the project. These institutions' resource centers were instrumental in offering management development activities.

### Capacity Building Plan

During its first years of operation, Project MASTER implemented a training program for bilingual teachers. It proposed to strengthen their skills in science and its instruction. In spite of restricted budgets, participating

schools and Community School Districts (C.S.D.s) provided resources in the form of staff, classroom space, utilities, and computer hardware to complement this aspect of the project.

Implementation of New York State Science Syllabus

The project showed great success in integrating a hands-on instructional program into the existing school curriculum. It developed lesson outlines, curriculum units, and resource materials for the adaptation of the science syllabus curriculum to the needs of LEP students.

Reconstruction of the South Bronx Project

Project students actively engaged in activities related to this reconstruction project, a successful experiment in bilingual integrated learning that was initiated a few years ago in the South Bronx. Project students worked with architects, historians, photographers, and artists who taught them to pay attention to their surroundings, to observe architectural details in buildings, windows, and cornices; to observe forms and shapes of found objects, including broken bottles; to feel the texture of rocks and building walls.

Last spring the project participated in an exhibition at the Bronx County Courthouse, "Imagination Celebration." It consisted of displays by participating students and artists of archaeological findings, architectural drawings and models, photographic murals, and mosaics.

Parental Involvement

Project MASTER held an open house at P.S. 29 in November at which the staff discussed the project's orientation and goals. The project also provided several monthly workshops for the parents. Parents were also involved with the student's enrichment projects and accompanied them on various educational and cultural trips.

## IV. CONCLUSIONS AND RECOMMENDATION

Project MASTER completed its fourth year of operation. Its holistic approach toward education concentrated on science as a bridge to mastering English communication skills, and mathematics, computer, and critical thinking skills. Moreover, it launched a number of initiatives to foster students' involvement with the arts, both as a means of self-expression and as a potential career. The project made special efforts to provide resources and coordinate services for its students through several educational agencies and institutions.

Project MASTER met its objectives for E.S.L. and mathematics. Project students made significant gains in both subjects. The lack of an appropriate instrument made it impossible to assess the achievement of the science objective.

The conclusions, based on the findings of this evaluation, lead to the following recommendation:

- Dedicate such resources as are possible to the capacity building plan for bilingual teachers to provide the expertise necessary for the incorporation of the project's holistic methodology into the regular school program.